



**Integral University, Lucknow**  
**Integral Institute of Agricultural Science and Technology**  
**Evaluation Scheme of Post Graduate Program**  
**w.e.f. 2022-23**

**M. Sc. (Hort.) Vegetable Science**

**Semester-II**

Course Code	Course Title	Type of Course	Periods/Per week			Evaluation Scheme Theory Mid Sem			Evaluation Scheme Practical Mid Sem			Practical End Sem Exam	Sub Total (Theory + Practical Mid Sem Exam)	End Sem Theory Exam	Subject Total	Credit	Total Credit Points	Attributes						
			L	T	P	CT	TA	Total	CT	TA	Total							Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics
VSC 502	Production of Warm Season Vegetable Crops	Major	2	0	2	20	10	30	-	-	-	20	50	50	100	2:0:1	3	√	√	√	√	√	√	√
VSC 504	Principles of Vegetable Breeding		2	0	2	20	10	30	-	-	-	20	50	50	100	2:0:1	3	√	√	√	√	√	√	√
VSC 507	Protected Cultivation of Vegetable Crops	Optional	1	0	2	20	10	30	-	-	-	20	50	50	100	1:0:1	2	√	√	√	√	√	√	√
<b>Total</b>																	*							
*Major Course (Core course + Optional course) should not exceed more than 9 credit																								
FSC 502	Sub-Tropical and Temperate Fruit Production	Minor	2	0	2	20	10	30	-	-	-	20	50	50	100	2:0:1	3	√	√	√	√	√	√	√
		Supporting																						
<b>Total</b>																	**							
PGS502	Technical Writing and Communications Skills	Common	0	0	2	0	0	-	-	-	-	25	75	0	100	0:0:1	1	√		√				√
PGS505 (e-Course)	Agricultural Research, Research Ethics and Rural Development Programmes		1	0	0	20	10	30	-	-	-	0	0	70	100	1:0:0	1	√		√			√	√
VSC 591	Master's Seminar		-	-	-	-	-	-	-	-	-	-	-	-	100	0:0:1	1			√				
VSC 599	Master's Research		-	-	-	-	-	-	-	-	-	-	-	-	S/US	0:0:5	5 <sup>s</sup>	√		√			√	√
<b>Grand Total</b>																	***							

Grand Total (\*\*\*) = \*+\*\*, credit should not exceed more than 22 credit in one semester, <sup>s</sup>Master's Research credit to be counted in Final Semester examinations;  
 S/US=Satisfactory/Unsatisfactory

**M. Sc. (Hort.) Vegetable Science**  
**SEMESTER-III**  
**Course Title: Production of Warm Season Vegetable Crops**  
**Course Code: VSC 502**  
**w.e.f. Session 2022-23**

3(2+1)

Introduction, commercial and nutritional importance, origin and distribution, botany and taxonomy, area, production, productivity and constraints, soil requirements, climatic factors for yield and quality, commercial varieties/ hybrids, seed rate and seed treatment, raising of nursery including grafting technique, sowing/ planting time and methods, precision farming, cropping system, nutritional including micronutrients and irrigation requirements, intercultural operations, special horticultural practices namely hydroponics, aeroponics, weed control, mulching, role of plant growth regulators, physiological disorders, maturity indices, harvesting, yield, post-harvest management (grading, packaging and marking), pest and disease management and economics of crops in:

**Unit-I**

Fruit vegetables—Tomato, brinjal, hot pepper, sweet pepper and okra.

**Unit-II**

Beans—French bean, Indian bean (Sem), cluster bean and cowpea.

**Unit-III**

Cucurbits—Cucumber, melons, gourds, pumpkin, and squashes.

**Unit-IV**

Tuber crops—Sweet potato, elephant foot yam, tapioca, taro and yam.

**Unit-V**

Leafy vegetables—Amaranth and drumstick.

**Practical:**

Scientific raising of nursery and seed treatment; Sowing and transplanting; Description of commercial varieties and hybrids; Demonstration on methods of irrigation, fertilizers and micronutrients application; Mulching practices, weed management; Use of plant growth substances in cool season vegetable crops; Study of nutritional and physiological disorders; Studies on hydroponics, aeroponics and other soilless culture; Identification of important pest and diseases and their control; Preparation of cropping scheme for commercial farms; Visit to commercial farm, greenhouse/polyhouses; Visit to vegetable market; Analysis of benefit to cost ratio.

**Suggested Readings:**

- Bose TK, Kabir J, Maity TK, Parthasarathy VA and Som MG. 2003. Vegetable crops. Vols. I-III. Naya udyog.
- Bose TK, Som MG and Kabir J. (Eds.). 1993. Vegetable crops. Naya prokash.
- Chadha KL and Kallou G. (Eds.). 1993-94. Advances in horticulture Vols. V-X. Malhotra publ. house.
- Chadha KL. (Ed.). 2002. Hand book of horticulture. ICAR.
- Chauhan DVS. (Ed.). 1986. Vegetable production in India. Ram prasad and sons.
- Fageria MS, Choudhary BR and Dhaka RS. 2000. Vegetable crops: production technology. Vol. II. Kalyani.
- Gopalakrishanan TR. 2007. Vegetable crops. New India publ. agency.
- Hazra P and Banerjee MK and Chattopadhyay A. 2012. Varieties of vegetable crops in India, (Second edition), Kalyani publishers, Ludhiana, 199 p.
- Hazra P. 2016. Vegetable science. 2nd edn, Kalyani publishers, Ludhiana.
- Hazra P. 2019. Vegetable production and technology. New India publishing agency, New Delhi.

- Hazra P, Chattopadhyay A, Karmakar K and Dutta S. 2011. Modern technology for vegetable production, New India publishing agency, New Delhi, 413p
- Rana MK. 2008. Olericulture in India. Kalyani Publishers, New Delhi.
- Rana MK. 2008. Scientific cultivation of vegetables. Kalyani Publishers, New Delhi.
- Rubatzky VE and Yamaguchi M. (Eds.). 1997. World vegetables: principles, production and nutritive values. Chapman and Hall.
- Saini GS. 2001. A text book of oleri and flori culture. Aman publishing house.
- Salunkhe DK and Kadam SS. (Ed.). 1998. Hand book of vegetable science and technology: production, composition, storage, and processing. Marcel dekker.
- Shanmugavelu KG., 1989. Production technology of vegetable crops. Oxford and IBH.
- Singh DK. 2007. Modern vegetable varieties and production technology. International book distributing Co.
- Singh SP. (Ed.). 1989. Production technology of vegetable crops. Agril. comm. res. centre.
- Thamburaj S and Singh N. (Eds.). 2004. Vegetables, tuber crops and spices. ICAR.
- Thompson HC and Kelly WC. (Eds.). 1978. Vegetable crops. Tata McGraw-Hill.

#### **COURSE OBJECTIVES:**

- To know about the importance and historical knowledge of warm season vegetables of tuber and leafy crops.
- To impart comprehensive knowledge about the scientific production technology of vegetables specially grown in warm season
- Knowledge of crop protection measure in different crops

#### **COURSE OUTCOMES (CO):**

*After completion of course, a student will be able to*

<b>COURSE OUTCOME (CO)</b>	<b>DESCRIPTION</b>
<b>CO1</b>	To impart basic knowledge about the importance and management of warm season vegetables grown in India. Understand the package of practices of crops
<b>CO2</b>	Impart knowledge of varietal importance to improve the production and quality of vegetables
<b>CO3</b>	By the end of course students will have the idea of production methods of different warm season crops.
<b>CO4</b>	Calculate the agro-chemical doses to control biotic stresses
<b>CO5</b>	Understand the package of practices of crops Identify and control of important physiological disorders

#### **CO-PO-PSO mapping**

	<b>PO</b>												<b>PSO</b>		
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	2	2	2	3	3	2	1	2	2	2	3	3	2	2	1
<b>CO2</b>	3	3	3	3	1	1	2	1	3	2	3	2	2	3	2
<b>CO3</b>	3	2	3	3	3	1	2	2	2	3	3	3	2	1	2
<b>CO4</b>	3	2	2	3	3	2	1	3	3	3	3	3	2	3	2
<b>CO5</b>	3	2	3	3	3	1	2	2	3	3	3	3	2	1	2

3: Strong contribution, 2: average contribution, 1: Low contribution

**M. Sc. (Hort.) Vegetable Science**  
**SEMESTER-II**  
**Course Title: Principles of Vegetable Breeding**  
**Course Code: VSC 504**  
**w.e.f. Session 2022-2023**

3(2+1)

**Unit-I**

Importance and history- Importance, history and evolutionary aspects of vegetable breeding and its variation from cereal crop breeding.

**Unit-II**

Selection procedures- Techniques of selfing and crossing; Breeding systems and methods; Selection procedures and hybridization; Genetic architecture; Breeding for biotic stress (diseases, insect pests and nematode), abiotic stress (temperature, moisture and salt) resistance and quality improvement; Breeding for water use efficiency (WUE) and nutrients use efficiency (NUE).

**Unit-III**

Heterosis breeding- Types, mechanisms and basis of heterosis, facilitating mechanisms like male sterility, self-incompatibility and sex forms.

**Unit-IV**

Mutation and Polyploidy breeding; Improvement of asexually propagated vegetable crops and vegetables suitable for protected environment.

**Unit-V**

Ideotype breeding- Ideotype breeding; varietal release procedure; DUS testing in vegetable crops; Application of *In-vitro* and molecular techniques in vegetable improvement.

**Practical:**

Floral biology and pollination behaviour of different vegetables; Techniques of selfing and crossing of different vegetables *viz.*, Cole crops, okra, cucurbits, tomato, eggplant, hot pepper, etc.; Breeding system and handling of filial generations of different vegetables; Exposure to biotechnological lab practices; Visit to breeding farms.

**Suggested Readings:**

- Allard RW. 1960. Principle of plant breeding. John Willey and Sons, USA.
- Kalloo G. 1988. Vegetable breeding (Vol. I, II, III). CRC Press, Fl, USA.
- Kole CR. 2007. Genome mapping and molecular breeding in plants-vegetables. Springer, USA.
- Peter KV and Pradeep Kumar T. 1998. Genetics and breeding of vegetables. ICAR, New Delhi, p. 488.
- Prohens J and Nuez F. 2007. Handbook of plant breeding-vegetables (Vol I and II). Springer, USA.
- Singh BD. 2007. Plant breeding- principles and methods (8th edn.). Kalyani Publishers, New Delhi.
- Singh Ram J. 2007. Genetic resources, chromosome engineering, and crop improvement-vegetable crops (Vol. 3). CRC Press, Fl, USA.

**COURSE OBJECTIVES:**

- To update knowledge on the recent research trends in the field of breeding of fruit crops with special emphasis on tropical, subtropical and temperate crops grown in India.
- Familiarization with different chemical and methods for dormancy breakage different vegetables seeds.
- Knowledge of extrinsic factors for vegetable crops.

**COURSE OUTCOMES (CO):**

*After completion of course, a student will be able to*

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Able to about growth and developmental requirement of different vegetable crops.
CO2	Familiarization with general knowledge of botany and crop plants
CO3	To impart theoretical knowledge and practical skills about plant breeding objectives.
CO4	To learn modes of reproduction and genetic consequences, breeding methods for crop improvement.
CO5	Conceptualize about different aspects of plant breeding, hybrid vigour and release of variety

**CO-PO-PSO mapping**

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	2	2	2	1	3	3	2	2	2	3	2
CO2	3	3	3	3	3	3	3	3	3	2	3	3	1	1	3
CO3	2	3	1	3	3	2	3	3	3	3	3	1	3	3	3
CO4	2	2	2	2	2	2	2	3	2	1	2	2	3	2	1
CO5	3	2	3	2	2	3	2	3	3	3	2	3	1	3	2

3: Strong contribution, 2: average contribution, 1: Low contribution

**M. Sc. (Hort.) Vegetable Science**  
**SEMESTER-II**  
**Course Title: Protected Cultivation of Vegetable Crops**  
**Course Code: VSC 507**  
**w.e.f. Session 2022-2023**

**3(2+1)**

**Unit-I**

Scope and importance- Concept, scope and importance of protected cultivation of vegetable crops; Principles, design, orientation of structure, low and high cost polyhouses/greenhouse structures.

**Unit-II**

Types of protected structure- Classification and types of protected structures greenhouse/polyhouses, plastic-non plastic low tunnels, plastic walk in tunnels, high roof tunnels with ventilation, insect proof net houses, shed net houses, rain shelters, NVP, climate control greenhouses, hydroponics and aeroponics; Soil and soilless media for bed preparation; Design and installation of drip irrigation and fertigation system.

**Unit-III**

Abiotic factors- Effect of environmental factors and manipulation of temperature, light, carbon dioxide, humidity, etc. on growth and yield of different vegetables.

**Unit-IV**

Nursery raising- High tech vegetable nursery raising in protected structures using plugs and portrays, different media for growing nursery under protected cultivation; Nursery problems and management technologies including fertigation.

**Unit-V**

Cultivation of crops- Regulation of flowering and fruiting in vegetable crops; Technology for raising tomato, sweet pepper, cucumber and other vegetables in protected structures, including varieties and hybrids, training, pruning and staking in growing vegetables under protected structures.

**Unit-VI**

Solutions to problems- Problems of growing vegetables in protected structures and their remedies, physiological disorders, insect and disease management in protected structures; Use of protected structures for seed production; Economics of greenhouse crop production.

**Practical:**

Study of various types of protected structure; Study of different methods to control temperature, carbon dioxide and light; Study of different types of growing media, training and pruning systems in greenhouse crops; Study of fertigation and nutrient management under protected structures; Study of insect pests and diseases in greenhouse and its control; Use of protected structures in hybrid seed production of vegetables; Economics of protected cultivation (Any one crop); Visit to established green/polyhouses/shade net houses in the region.

**Suggested Readings:**

- Chadha KL and Kalloo G. (Eds.). 1993-94. Advances in horticulture. Malhotra Pub. House.
- Chandra S and Som V. 2000. Cultivating vegetables in green house. Indian horticulture 45:17-18.
- Kalloo G and Singh K. (Eds.). 2000. Emerging scenario in vegetable research and development. Research periodicals and Book publ. house.
- Parvatha RP. 2016. Sustainable crop protection under protected cultivation. E-Book Springer.
- Prasad S and Kumar U. 2005. Greenhouse management for horticultural crops. 2nd Ed. Agrobios.
- Resh HM. 2012. Hydroponic food production. 7th Edn. CRC Press.

- Singh B. 2005. Protected cultivation of vegetable crops. Kalyani publishers, New Delhi
- Singh DK and Peter KV. 2014. Protected cultivation of horticultural crops (1st Edition) New India publishing agency, New Delhi.
- Singh S, Singh B and Sabir N. 2014. Advances in protected cultivation. New India publishing agency, New Delhi.
- Tiwari GN. 2003. Green house technology for controlled environment. Narosa publ. house.

**COURSE OBJECTIVES:**

- Understanding the principle, theoretical aspects and developing skills in protected cultivation of horticultural crops.
- Knowing about the history of vegetable crops and their evolution.

**COURSE OUTCOMES (CO):**

*After completion of course, a student will be able to*

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Able to know what is the significance of systematics and crop diversity in vegetable crops
CO2	To acquaint with green house technology, types of Green Houses; Plant response to green house Environment.
CO3	Study of different type of green houses based on shape.
CO4	Determine the rate of air exchange in an active summer winter cooling system.
CO5	Determination of drying rate of agricultural products inside green house.

**CO-PO-PSO mapping**

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2	3	2	2	2	2	3	2	2	2	2	3	2
CO2	3	3	3	3	3	3	3	3	3	3	3	1	3	1	1
CO3	3	3	1	3	3	1	3	3	3	3	3	3	1	3	3
CO5	2	3	3	2	2	3	2	2	3	3	2	1	3	3	3

3: Strong contribution, 2: average contribution, 1: Low contribution

**M. Sc. (Hort.) Fruit Science**  
**SEMESTER-II**  
**Course Title: Subtropical and Temperate Fruit Production**  
**Course Code: FSC 502**  
**w.e.f. Session 2022-2023**

**3(2+1)**

**Unit-I**

Importance and Background: Origin, distribution and importance, major species, rootstocks and commercial varieties of regional, national and international importance, eco-physiological requirements for Crops Citrus, Grapes, Litchi, Pomegranate, Apple, Pear, Peach, Plum, Apricot, Cherries, Berries, Persimmon, Kiwifruit, Nuts- Walnut, Almond, Pecan, etc.

**Unit-II**

Propagation, Planting and Orchard Floor Management: Propagation, planting systems and densities, training and pruning, rejuvenation and replanting, intercropping, nutrient management, water management, fertigation, use of bio-fertilizers, role of bio-regulators, abiotic factors limiting fruit production for Crops Citrus, Grapes, Litchi, Pomegranate, Apple, Pear, Peach, Plum, Apricot, Cherries, Berries, Persimmon, Kiwifruit, Nuts- Walnut, Almond, Pecan, etc.

**Unit III**

Flowering, Fruit-Set and Harvesting: Physiology of flowering, pollination management, fruit set and development, physiological disorders – causes and remedies, crop regulation, quality improvement by management practices; maturity indices, harvesting, grading, packing, storage and ripening techniques; insect and disease management for Crops Citrus, Grapes, Litchi, Pomegranate, Apple, Pear, Peach, Plum, Apricot, Cherries, Berries, Persimmon, Kiwifruit, Nuts- Walnut, Almond, Pecan, etc.

**Practical:**

Distinguished features of tropical fruit species, cultivars and rootstocks; Demonstration of planting systems, training and pruning; Hands on practices on pollination and crop regulation; Leaf sampling and nutrient analysis; Physiological disorders-malady diagnosis; Physico-chemical analysis of fruit quality attributes; Field/Exposure visits to subtropical and temperate orchards. Project preparation for establishing commercial orchards.

**Suggested Readings:**

- Chadha KL and Awasthi RP. 2005. The Apple. Malhotra Publishing House, New Delhi.
- Chadha TR. 2011. A Text Book of Temperate Fruits. ICAR, New Delhi
- Childers NF, Morris JR and Sibbett GS. 1995. Modern Fruit Science: Orchard and Small Fruit Culture. Horticultural Publications, USA.
- Creasy G and Creasy L. 2018. Grapes. CAB International.
- Davies FS and Albrigo LG. 1994. Citrus. CAB International.
- Dhillon WS. 2013. Fruit Production in India. Narendra Publishing House, New Delhi.
- Jackson D, Thiele G, Looney NE and Morley-Bunker M. 2011. Temperate and Subtropical Fruit Production. CAB International.
- Ladanyia M. 2010. Citrus Fruit: Biology, Technology and Evaluation. Academic Press.
- Layne DR and Bassi D. 2008. The Peach: Botany, Production and Uses. CABI.
- Menzel CM and Waite GK. 2005. Litchi and Longan: Botany, Production and Uses. CAB International.
- Pandey RM and Randey SN. 1996. The Grape in India. ICAR, New Delhi.



- Rajput CBS, and Haribabu RS. 2006. Citriculture, Kalyani Publishers, New Delhi.
- Sandhu S and Gill BS. 2013. Physiological Disorders of Fruit Crops. NIPA, New Delhi.
- Sharma RM, Pandey SN and Pandey V. 2015. The Pear – Production, Post-harvest Management and Protection. IBDC Publisher, New Delhi.
- Sharma RR and Krishna H. 2018. Textbook of Temperate Fruits. CBS Publishers and Distributors Pvt. Ltd., New Delhi.
- Singh S, Shivshankar VJ, Srivastava AK and Singh IP. 2004. Advances in Citriculture. NIPA, New Delhi.
- Tromp J, Webster AS and Wertheim SJ. 2005. Fundamentals of Temperate Zone Tree Fruit Production. Backhuys Publishers, Lieden, The Netherlands.
- Webster A and Looney N. Cherries: Crop Physiology, Production and Uses. CABI.
- Westwood MN. 2009. Temperate Zone Pomology: Physiology and Culture. Timber Press, USA.

**COURSE OBJECTIVES:**

- Importance of fruit production, major species and varieties of Sub Tropical and Temperate fruit crops
- Knowledge about different species, rootstock and different methods propagation of Sub Tropical and Temperate fruit crops
- Familiar the students about training, pruning and nutrient management of fruit crops.
- To know about different physiological disorders of fruit crops.

**COURSE OUTCOMES (CO):**

*After completion of course, a student will be able to*

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Aware about different species, Rootstock and varieties of fruit crops.
CO2	Students know about different types of propagation methods
CO3	Students also aware about the flowering physiology of fruit crops
CO4	Aware about the different methods of crop regulation
CO5	Familiar with the methods of training and pruning.

**CO-PO-PSO mapping**

CO	PO											PSO			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	3	3	1	3	1	1	3	3	2	3	2	3
CO2	2	3	2	2	3	2	2	1	1	1	2	3	3	3	2
CO3	3	2	1	1	3	1	3	2	1	2	3	3	2	2	3
CO4	2	2	1	3	3	2	2	1	1	1	1	2	3	3	3
CO5	3	2	1	3	3	1	3	2	1	1	3	3	3	3	3

3: Strong contribution, 2: average contribution, 1: Low contribution

**M. Sc. (Ag.)/M.Sc. (Hort.)/MBA Agribusiness Management**  
**SEMESTER-II**  
**Course Title: Technical Writing and Communications Skills**  
**Course Code: PGS502**  
**w.e.f. Session 2018-19**

**1(1+0)**

**Practical: Technical Writing** - Various forms of scientific writings- theses, technical papers, reviews, manuals, etc; Various parts of thesis and research communications (title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion); Writing of abstracts, summaries, précis, citations etc.; commonly used abbreviations in the theses and research communications; illustrations, photographs and drawings with suitable captions; pagination, numbering of tables and illustrations; Writing of numbers and dates in scientific write-ups; Editing and proof-reading; Writing of a review article. **Communication Skills** - Grammar (Tenses, parts of speech, clauses, punctuation marks); Error analysis (Common errors); Concord; Collocation; Phonetic symbols and transcription; Accentual pattern: Weak forms in connected speech: Participation in group discussion: Facing an interview; presentation of scientific papers.

**Suggested Readings**

- Wren PC & Martin H. 2006. High School English Grammar and Composition. S. Chand & Co.
- Robert C. (Ed.). 2005. Spoken English: Flourish Your Language. Abhishek.
- Mohan K. 2005. Speaking English Effectively. MacMillan India.
- Sethi J & Dhamija PV. 2004. Course in Phonetics and Spoken English. 2nd Ed. Prentice Hall of India.
- Hornby AS. 2000. Comp. Oxford Advanced Learner's Dictionary of Current English. 6th Ed. Oxford University Press.
- Joseph G. 2000. MLA Handbook for Writers of Research Papers. 5th Ed. Affiliated East-West Press.
- Chicago Manual of Style. 14th Ed. 1996. Prentice Hall of India.
- Collins' Cobuild English Dictionary. 1995. Harper Collins.
- James HS. 1994. Handbook for Technical Writing. NTC Business Books.
- Gordon HM & Walter JA. 1970. Technical Writing. 3rd Ed. Holt, Rinehart & Winston.
- Richard WS. 1969. Technical Writing. Barnes & Noble.

**COURSE OBJECTIVES:**

- To give knowledge about the various forms of scientific writings
- To give knowledge about the various parts of thesis, research communications
- To give knowledge about writing of abstracts, summaries, citations etc
- To give knowledge about research communications, illustrations, photograph, drawings
- To give knowledge about pagination, scientific write ups, editing and proof reading, and writing of review article

**COURSE OUTCOMES (CO):**

*After completion of the course, a student will be able to*

<b>COURSE OUTCOME (CO)</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Learn that what are the various forms of scientific writings
<b>CO2</b>	Learn how to write the various parts of thesis, research communications
<b>CO3</b>	Learn how to do writing of abstracts, summaries and what are citations etc
<b>CO4</b>	Learn research communications, illustrations, photograph, drawings
<b>CO5</b>	Learn pagination, scientific write ups, editing and proof reading, and writing of review article

**CO-PO-PSO MAPPING:**

<b>CO</b>	<b>PO</b>												<b>PSO</b>		
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	3	3	1	2	0	0	2	0	1	1	3	3	2	2	1
<b>CO2</b>	3	3	1	2	0	3	2	0	0	0	3	2	2	2	2
<b>CO3</b>	3	3	1	0	0	1	2	0	0	0	3	3	2	2	2
<b>CO4</b>	3	3	2	3	0	2	2	0	0	0	3	3	2	2	2
<b>CO5</b>	3	3	2	3	0	3	2	1	0	0	3	3	2	2	1
3: Strong contribution, 2: average contribution, 1: Low contribution															

**M. Sc. (Ag.)/M.Sc. (Hort.)/MBA Agribusiness Management  
SEMESTER-II**

**Course Title: Agricultural Research, Research Ethics and Rural Development Programmes**

**Course Code: PGS505 (e-Course)**

**w.e.f. Session 2018-19**

**1(0+1)**

**Unit-I**

History of agriculture in brief; Global agricultural research system: need, scope, opportunities; Role in promoting food security, reducing poverty and protecting the environment; National Agricultural Research Systems (NARS) and Regional Agricultural Research Institutions; Consultative Group on International Agricultural Research (CGIAR): International Agricultural Research Centers (IARC), partnership with NARS, role as a partner in the global agricultural research system, strengthening capacities at national and regional levels; International fellowships for scientific mobility.

**Unit-II**

Research ethics: research integrity, research safety in laboratories, welfare of animals used in research, computer ethics, standards and problems in research ethics.

**Unit-III**

Concept and connotations of rural development, rural development policies and strategies. Rural development programmes: Community Development Programme, Intensive Agricultural District Programme, Special group – Area Specific Programme, Integrated Rural Development Programme (IRDP) Panchayati Raj Institutions, Co-operatives, Voluntary Agencies/Non-Governmental Organizations. Critical evaluation of rural development policies and programmes. Constraints in implementation of rural policies and programmes.

**Suggested Readings:**

- Bhalla GS & Singh G. 2001. Indian Agriculture - Four Decades of Development. Sage Publ.
- Punia MS. Manual on International Research and Research Ethics. CCS, Haryana Agricultural University, Hisar.
- Rao BSV. 2007. Rural Development Strategies and Role of Institutions - Issues, Innovations and Initiatives. Mittal Publ.
- Singh K. 1998. Rural Development - Principles, Policies and Management. Sage Publ..

**COURSE OBJECTIVES:**

- To know the objective and principle of extension education
- To obtain idea on various development programmes in agriculture and allied area to help farmers.
- To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

**COURSE OUTCOMES (CO):**

*After completion of the course, a student will be able to*

<b>COURSE OUTCOME (CO)</b>	<b>DESCRIPTION</b>
<b>CO1</b>	Students capable, efficient, and self-reliant in character.
<b>CO2</b>	They gain knowledge to help rural families in better appreciation of SWOT in the village.
<b>CO3</b>	They know about to open new opportunities for developing talents and leadership of rural people.
<b>CO4</b>	To provide knowledge and help for better management of farms and increase incomes.
<b>CO5</b>	To promote better social, natural recreational intellectual and spiritual file among the people.

**CO-PO-PSO MAPPING:**

<b>CO</b>	<b>PO</b>												<b>PSO</b>		
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>
<b>CO1</b>	3	1	2	1	1	3	3	3	2	3	1	1	1	1	1
<b>CO2</b>	3	3	3	1	1	3	3	3	2	3	3	2	2	2	2
<b>CO3</b>	3	2	1	1	1	2	3	3	2	1	2	1	1	1	2
<b>CO4</b>	3	2	2	2	1	3	3	3	2	2	3	1	2	2	2
<b>CO5</b>	3	1	1	1	1	2	3	3	2	2	3	3	1	1	1
3: Strong contribution, 2: average contribution, 1: Low contribution															